FACTSHEET Manufacture of metals[1]

AIM OF THE FACTSHEET

The benchmark factsheet is designed for companies or investors to assess a sector's impact on biodiversity. Companies can use the factsheet to compare their impacts (*e.g.*, assessed with the Global Biodiversity Score tool) to the sector average or to estimate their impacts and main pressures on biodiversity. Also, investors can use it to screen their biodiversity impacts, or rate specific companies' performance against sectoral benchmarks. Finally, factsheets will help nourish the work of the EU Taxonomy by identifying low impact companies. It is supported by a technical annex and a reading guide.

The calculations were performed using GBS version 1.4.6 in August 2023.

WHAT DOES THE SECTOR INCLUDE?

The sector covers:

- Manufacture of basic iron and steel and of ferro-alloys and first products thereof
- Production of precious metals, aluminium, lead, zinc and tin, copper and other non-ferrous metal
- Casting of metals
- Manufacture of fabricated metal products, except machinery and equipment
- Processing of nuclear fuel

KEY MESSAGES

➤ Overall, all the benchmark sector's industries have a higher terrestrial dynamic impact intensity compared to the world average, across their entire value chain. A significant part of those impacts is driven by **Climate change because of energy-intensive processes**.

➤ **Most impacts fall under Scope 3** as the Manufacture of metals sector is downstream of activities in the value chain, such as, the raw materials extraction sector.

➤ The highest Scope **1 dependencies** of the sector are related to **water-related ecosystem services** and **46 % of the value chain** is **critically dependent** on at least one ecosystem service.

EXIOBASE INDUSTRIES	NACE rev2 CODE
Manufacture of basic metals; Manufacture of fabricated metal products, except machinery and equipment; Electricity, gas, steam and air conditioning supply	C.24 Manufacture of basic metal C.25 Manufacture of fabricated metal products, except machinery and equipment

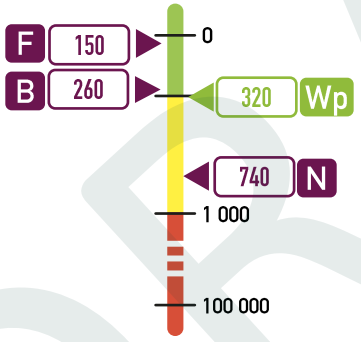
ECOSYSTEM SERVICES DEPENDENCIES Scope 1

Basic metals
21%

Fabricated metal products
24%

TERRESTRIAL STATIC PERFORMANCE OF THE SECTOR

Intensity (MSA.m²/kEUR)



B Basic metals vertically integrated terrestrial static intensity

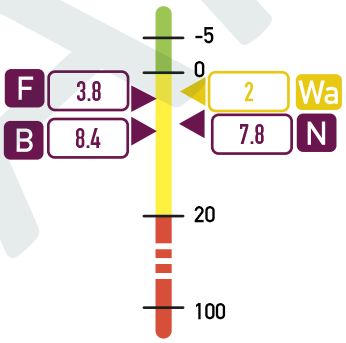
F Fabricated metal products vertically integrated terrestrial static intensity

N Processing of nuclear fuel vertically integrated terrestrial static intensity

Wp World terrestrial static intensity compatible with planetary boundaries[2]

TERRESTRIAL DYNAMIC PERFORMANCE OF THE SECTOR

Intensity (MSA.m²/kEUR)



B Basic metals vertically integrated terrestrial dynamic intensity

F Fabricated metal products vertically integrated terrestrial dynamic intensity

N Processing of nuclear fuel vertically integrated terrestrial dynamic intensity

Wa Corporate world average terrestrial dynamic intensity

STATIC AGGREGATED SCORE Vertically integrated

Basic metals
3 400
MSAppb/bEUR

Fabricated metal products
2 060
MSAppb/bEUR

Processing of nuclear fuel
11 600
MSAppb/bEUR

BIODIVERSITY FOOTPRINT [3]

Realm	Accounting category	Impact intensity – MSA.m²/kEUR					
		Basic metals		Fabricated metal products		Processing of nuclear fuel	
		Scope 1	Vertically integrated[4]	Scope 1	Vertically integrated[4]	Scope 1	Vertically integrated[4]
Terrestrial	Static	0.54	260	0.47	150	0.79	740
	Dynamic	2.7	8.4	0.59	3.8	0.79	7.8
Aquatic[5]	Static	$1.2.10^{-2}$	17	$1.3.10^{-2}$	10.3	$2.5.10^{-2}$	63

(1) For practical reasons, the sector "manufacture of basic metals and fabricated metal products" is designated as "Manufacture of metals" in the factsheet and in the annex.

(2) World terrestrial static intensity compatible with planetary boundaries $= \frac{terrestrial\ static\ impact\ compatible\ with\ planetary\ boundary}{global\ turnover} = \frac{28\% MSA * total\ emerged\ land\ surface}{global\ turnover}$

(3) The results are broken down into three main categories: those related to the production of basic metals, those related to fabricated metal products and those related processing of nuclear fuel

(4) The vertically integrated results refer to the sum of Scope 1, 2 and upstream Scope 3 impacts.

(5) The aquatic dynamic results have a high uncertainty and are therefore not presented here. However, the data is available in the technical annex.

FACTSHEET Manufacture of metals(1)

KEY ISSUES OF THE SECTOR

ECOSYSTEM SERVICES DEPENDENCIES OF THE SECTOR

The direct dependencies of the sector are calculated by the ENCORE model, a tool developed to provide knowledge on sectors' dependency on various ecosystem services. Details about the methodology and the graphs displaying the output of all the dependencies are provided in the technical annex.

Processing of metals industries have "low" to "medium" dependency on ecosystem services in their Scope 1. Their aggregated score is between 10 % to 24 %, depending on the industries. However, most of them rely on water-related ecosystem services: ground water, surface water as well as water flow maintenance that keeps water circulating by recharging aquifers and maintaining surface water flows (dependency score of 60 % for these ecosystem services (processing of nuclear fuel excluded)). Water plays indeed an important role in the processes of all industries of the sector (see p.3) but these dependencies are not specific to the sector.

However, the Upstream Scope 3 critical score for industries of the sector is 46 %. **It means that 46 % of the value chain is critically dependent on at least one ecosystem service (with very few variations of score between the industries of the sector).**

HOW DOES THE SECTOR CONTRIBUTE TO CHANGES IN THE STATE OF NATURAL CAPITAL?

Due to the use of energy-intensive processes, the Manufacture of metals sector contributes significantly to the pressure of **Climate change** which is the third driver of biodiversity loss worldwide(6). Those impacts are mainly due to Upstream Scope 3.

The sector's impacts mainly occur in Upstream Scope 3 as the sector relies heavily on extracted raw materials. Thus, actions to limit impacts and pressures driven by **mining activities** must be taken. For further information on this subject, please refer to the factsheet on Raw materials extraction.

With the use of chemicals during processes of separation of metal from ores (both Scope 1 and Upstream Scope 3), the sector is also contributing to the **Pollution** pressure on ecosystems (potential release of gaseous, liquid and solid emissions)(7).

Last, processes of the sector require water, to cool down during the castings of metal for example. This use of water is contributing to the pressure Hydrological disturbance due to direct water use. This impact is likely to worsen in the future with more droughts and the increase competition for water use.

RISKS AND OPPORTUNITIES

To achieve its goal to become the first carbon-neutral continent by 2050, Europe needs to guarantee a sustainable access to strategic metals : copper for grid electrification, nickel for car batteries… A risk of competition on metals, which are the raw materials of the industries of the sector, is likely. In order to avoid this risk and to reduce their biodiversity footprint, the industries of the sector should 1) **reduce** their use of metals as much as possible (*e.g.* by reducing the thickness of certain parts) 2) engage in **recycling and circular economy processes**. **Process optimization** is an economic and ecological opportunity to limit metal production losses in the process.

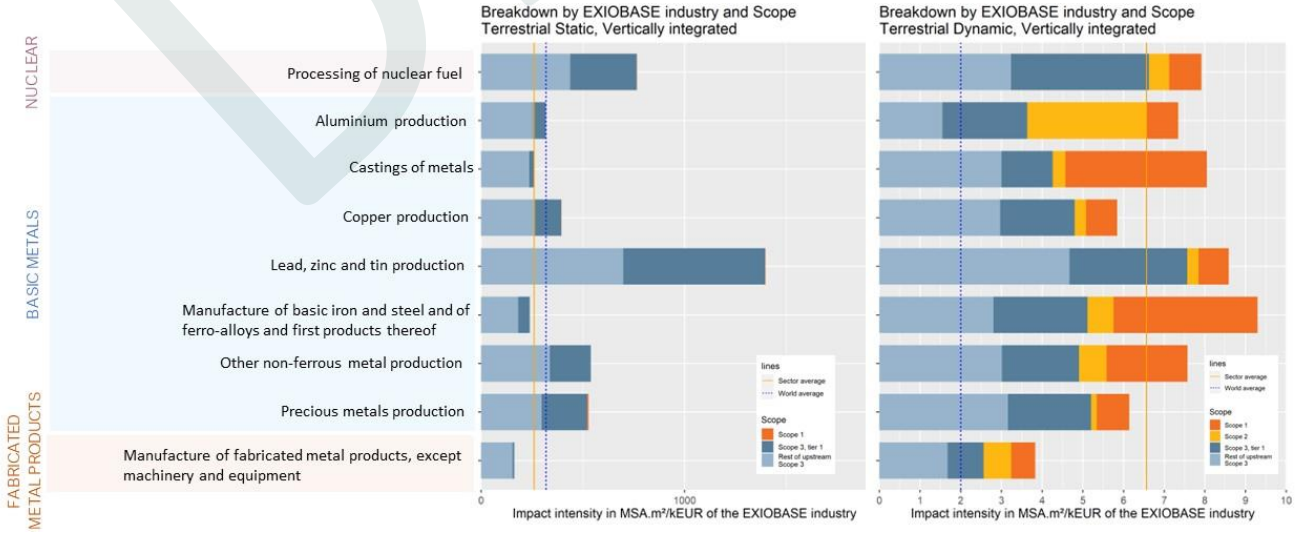
In addition, many industries of the sector have energy-intensive processes. Climate considerations are pushing the sector toward **renewable energy** to limit greenhouse gas emissions. It is also an opportunity to reduce pressures on biodiversity for a sector with a higher average than word average for vertically integrated dynamic impacts due to the commodity GHG. For further information on the biodiversity footprint of energy industries, please refer to the factsheet Energy (CDCB).

Scope AND INDUSTRY BREAKDOWN

Here is presented the breakdown of the terrestrial static and dynamic impacts by Scope and EXIOBASE industry. The results are in MSA.m²/kEUR (*i.e.,* for each EXIOBASE industry the impact is divided by the turnover of the corresponding industry, allowing the industries to position themselves compared to one another).

Regarding terrestrial static impacts, for all the benchmark sector's industries, impacts are concentrated in Upstream Scope 3 (Tier 1 of upstream and Rest of upstream). For most industries, at least one third of the impacts is related to the Tier 1 upstream Scope 3. This means that those impacts are related to **their direct suppliers**, which is **an opportunity** for the sector's industries as they have a **higher level of influence** on these impacts: they can encourage their direct suppliers to work on the identified pressures - or chose more sustainable suppliers.

Regarding terrestrial dynamic impacts, all industries of the sector have higher intensity impact in MSA.m²/kEUR than world average (6.6 MSA.m²/kEUR *vs* 2 MSA.m²/kEUR). This is mostly driven by the pressure Climate change due to energy-intensive processes of manufacture of metals, with the use of blast furnaces in some processes. Impact intensity of Scope 1 and Scope 2 of "Manufacture of basic iron, steel and ferro-alloys and first products thereof", "Casting of metals" and "Other non-ferrous production" industries are especially important compared to other industries of the sector (use of coal for iron production). The higher impact intensity of "Lead, zinc and tin production" industry can mostly be explained by its lower turnover than other industries such as "Aluminium production" for example. However, in mass intensity, the production of one tonne of tin is higher than most other metals (excluding gold and silver), which can also explain to some extent the results.



Source: GBS 1.4.6 computation, Aug 2023, Anna Montagner

(6) Source: IPBES 2019

(7) T. E. Norgate, S. Jahanshahi, and W. J. Rankin, « Assessing the Environmental Impact of Metal Production Processes », Journal of Cleaner Production, From Cleaner Production to Sustainable Production and Consumption in Australia and New Zealand: Achievements, Challenges, and Opportunities, 15, no 8 (1 January 2007): 838-48, https://doi.org/10.1016/j.jclepro.2006.06.018.

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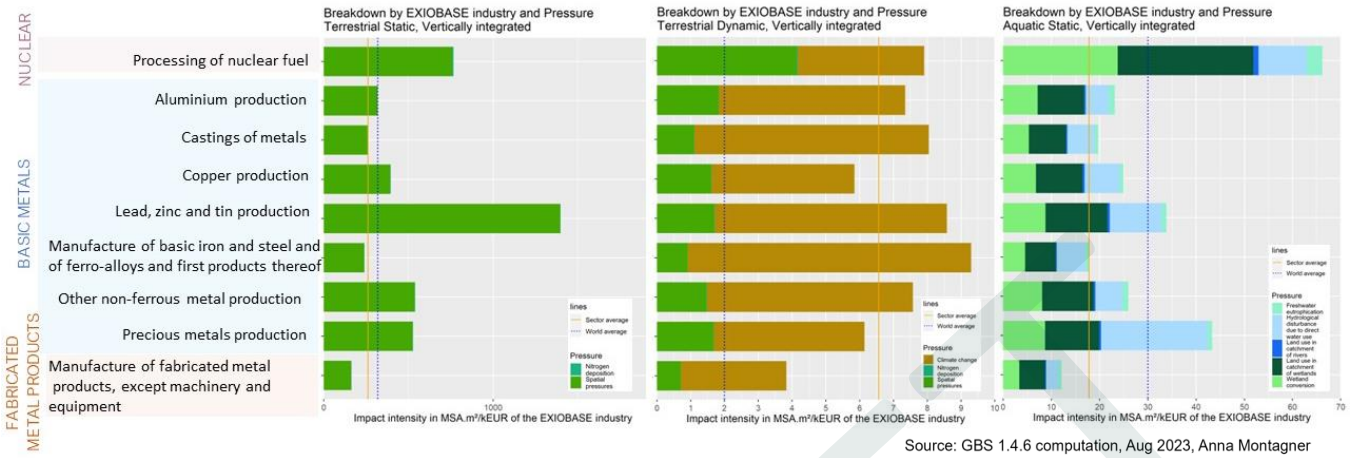
IMPACT DRIVERS BREAKDOWN



Source: GBS 1.4.6 computation, Aug 2023, Anna Montagner

Regarding terrestrial static results, all Scopes combined, Spatial pressures are the most important: Land Use, Encroachment and Fragmentation. As seen on page 2, terrestrial static impacts occur in Upstream Scope 3. Thus, Spatial pressures for the sector are mainly due to mining and first processing (mineral processing occurring at mine level). Climate change is the most important pressure in the results for terrestrial dynamic impacts[8].

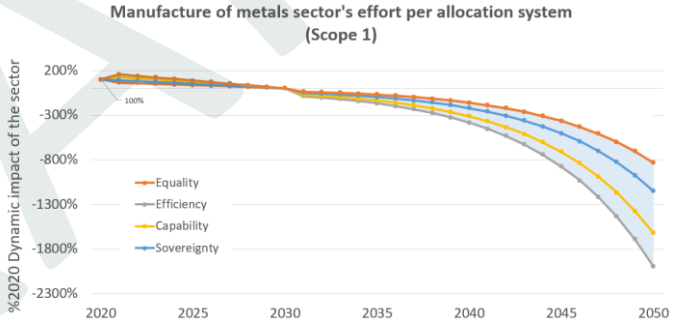
The two main pressures for aquatic static results are Wetland conversion and Hydrological disturbance due to direct water use. Most of the impact occurs in in Upstream Scope 3.

TRAJECTORIES TO ACHIEVE THE UPCOMING INTERNATIONAL TARGETS

The Post-2020 Global Biodiversity Framework (GBF) aims to reach at least a global no net loss of biodiversity in 2030 (interpreted as a global dynamic impact of 0 in 2030) and restore biodiversity between 2030 and 2050 (interpreted here as return to the "zone of functional integrity of the Earth system" by 2050). This global budget needs to be allocated to economic sectors and companies. Different allocation approaches (listed below) can be used to allocate efforts: these methods lead to different sectoral trajectories. This methodology focuses on the Scope 1 of each sector.

ALLOCATION	APPROACH	DATA USED
Equality	Everyone has the same right	Number of employees in the sectors (2010)
Efficiency	Cost-effectiveness	Restoration cost (EUR/[MSA.m²])
Capability	Industries' ability to pay	Turnover (MEUR) (2011)
Sovereignty	Grandfathering[1]	2020 dynamic impact (MSA.km²/year)

1. The grandfathering approach means that the obligations of industries (or companies) are based on their historic impacts, here their 2020 biodiversity dynamic impact.



The efficiency allocation approach requires the most effort by the sector, as it has a restoration cost lower than other sectors (*e.g.* 5 EUR/(MSA.m²) compared to 20 EUR/(MSA.m²) for the raw materials extraction sector). Due to its position downstream in the value chain, the effort of the sector for sovereignty allocation is lower but the effort in the capability allocation is important as the sector represents 4 % of the turnover of the total of all sectors of the economy. Regarding equality allocation, the sector has limited effort due to a limited number employees (2 % of the total employees for all sectors).

POSSIBLE ACTIONS TO REDUCE THE IMPACT ON BIODIVERSITY

	Basic metals	Fabricated metal products	Processing of nuclear fuel
Scope 1	Have an ambitious greenhouse gas reduction policy. Develop efficient technologies that reduce water consumption. Reduce the use of metals (e.g. by reducing the thickness of certain parts) Use recycled and reused water (be careful to ensure that is does not diminish the efficiency of the process).		
Scope 2	Promote renewable electricity with demonstrated low-impacts on biodiversity. Develop efficient technologies that reduce energy losses.		
UPSTREAM Scope 3	Reduce the use of primary metals by using recycled metals as secondary raw materials.		
	Engage with suppliers with lower-impact mining techniques that cause lower soil erosion and move less material that would need backfilled and that monitor pollution of the processes (air pollution, wastewater and solid waste) and develop efficient technologies that reduce pollution.		

[8] Climate change terrestrial static impacts is not included in calculation due to uncertainties but an estimation is proposed in the annex

FACTSHEET Manufacture of metals(1)

ENVIRONMENTAL SAFEGUARDS

Some impacts and pressures are not covered by the figures displayed in this benchmark factsheet (partly due to limitations in the Global Biodiversity Score tool used to obtain them). The technical annex provides a more detailed description of the uncertainties and limitations of the results. They should not be ignored when defining the biodiversity action plan.

- **Avoid locating activities on or near sites of high environmental value** or establish a specific management plan. For instance, avoid deforestation and encroachment on protected areas.
- **Restore habitats** during operations and/or after operations (IFC 2012).
- Conduct a **systematic review** to identify priority ecosystem services, meaning those on which project operations are most likely to have an impact and those on which the project is directly dependent (e.g., water) (IFC 2012).

Moreover, of the three components of biodiversity, the GBS only focuses on the ecosystem diversity, and does not cover species or genetic diversity.

See the GBS review report "Quality assurance" for the full list of environmental safeguards to implement (CDC Biodiversité 2020; IFC 2012).

The **EU Taxonomy Climate Delegated Act**, published in the official journal in December 2021, describes conditions for activities to make a substantial contribution to the climate objectives. Two industries of the sector are covered by the taxonomy as they are considered to make a substantial contribution to Climate change:

- Manufacture of Aluminium
- Manufacture of Iron and Steel

Technical Screening Criteria for a substantial contribution to Climate change mitigation, extracts from the Delegated Act on climate objectives (Official Journal of the European Union 2021) are presented in the annex (with the reduction amount of emissions needed by industry for example).

BIODIVERSITY FOOTPRINT ASSESSMENT

GENERAL OBJECTIVES OF A GBS-BASED ASSESSMENT

The factsheet helps companies of each sector to understand their most material impacts. However, a Biodiversity Footprint Assessment is more company-specific and allows to calculate the companies' impacts on biodiversity. Indeed, a GBS-based assessment uses companies' data (emissions, land use or other pressures, raw materials and products purchased and produced by the companies) to calculate biodiversity impacts.

Thus, a GBS-based Biodiversity Footprint Assessment allows to:

- **Quantitatively assess the biodiversity footprint** generated by the activity of the company or by its investment portfolio and to **assess the contribution of the company to global biodiversity erosion**;
- Understand which impacts drivers on biodiversity the company contributes to
- Provide elements for a **short-term** and a **mid-term action plan to reduce the footprint** on biodiversity and alleviate the contribution of the company to biodiversity erosion
- **Anticipate future mandatory biodiversity footprint disclosure** in France, in the European Union (action 30 of the French National Biodiversity Plan, CSDR), and in the world (Global Biodiversity Framework).

Limitations: The assessment does not consider some pollution impact drivers nor the existence and impacts of invasive species, the impacts on genetic and marine biodiversity.

HOW TO LEAD A BIODIVERSITY FOOTPRINT ASSESSMENT BASED ON THE GLOBAL BIODIVERSITY SCORE?

A GBS-based assessment can be led by **various organisms**:

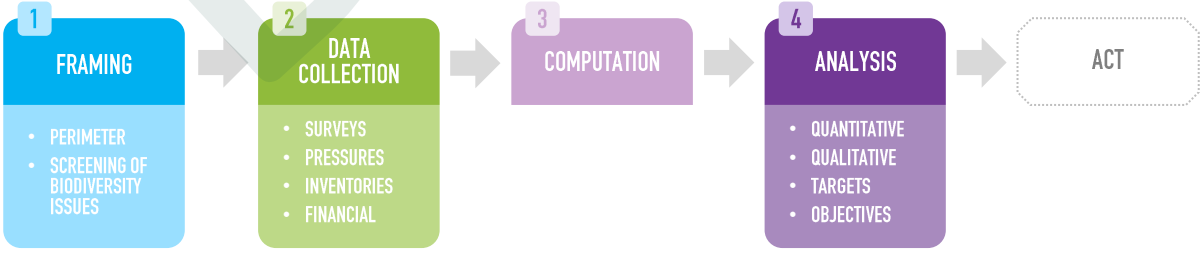
- The company itself, after being trained to use the GBS
- CDC Biodiversité or external GBS-trained assessors (list available here), instructed by the company
- A GBS-trained non-financial rating agency

A biodiversity footprint assessment follows **4 main steps**, as shown below:

- The **framing** step validates the Scope of the assessment, particularly in terms of **Scopes and assessed pressures**.
- During the **data collection** step, the **methodological choices** are validated: assumptions applied, proxies used, possible limits identified
- The **computation** uses the refined analysis and the pressure-impact relationships of the GBS tool to compute impacts.
- The **analysis** step explains the results obtained with the GBS by **identifying major impacts** as well as the **main sources of these impacts**. It is also an opportunity to identify objectives and **impact reduction actions, aligned with international recommendations**.

The **relevance** of the assessment depends on:

- The inclusion of direct operations and value chain impacts
- The consistency and transparency of the data and methodology used
- The appropriate quality assurance and complete disclosure of the results



Manufacture of metals factsheet version 5, June 2023. GBS computations: GBS 1.4.6, August 2023, Anna Montagner.

More information
About the GBS: Présentation PowerPoint (cdc-biodiversite.fr)
About the factsheets: https://www.cdc-biodiversite.fr/documentation-gbs/
Measuring the contributions of business and finance towards the post-2020 global biodiversity framework (CDC Biodiversité, 2020)
Establishing an ecosystem of stakeholders to measure the biodiversity performance of human activities (CDC Biodiversité, 2021)
The sources are referenced in the section "Manufacture of basic metals and fabricated metal products" of the technical annex.